

Claims

1. A device (10) for applying liquid or pasty application medium (16) to one or both sides of a moving substrate (U), comprising an applicator unit (12) which is arranged at a distance from the substrate (U) and discharges the application medium (16) onto the substrate (U) in the form of a free application medium jet (18),
- the substrate (U), in the case of direct application, being the surface (20a) of a material web (20), in particular of paper or board, and, in the case of indirect application, being the surface of a transfer element, preferably of a transfer roll, which then transfers the application medium to the surface of the material web, characterized in that in the region of the applicator unit (12) there is provided a device (30) for producing an electric field, which exerts on the application medium jet (18) moving from the applicator unit (12) to the substrate (U) a force which assists its movement.
2. The application device as claimed in claim 1, characterized in that the applicator unit is a curtain applicator unit (12) which discharges the application medium onto the substrate (U) as an application medium curtain (18) which moves from the applicator unit (12) to the substrate (U) substantially under the force of gravity.
3. The application device as claimed in claim 1, characterized in that the applicator unit is a free jet nozzle applicator unit, which discharges the application medium onto the substrate as an application medium jet which moves from the applicator unit to the substrate substantially on account of the expulsion momentum imparted to it by the applicator unit.

4. The application device as claimed in one of the preceding claims, characterized in that the applicator unit (12) is kept at a first predetermined electric potential (V_1).

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5. The application device as claimed in one of the preceding claims, characterized in that, at least in the vicinity of the applicator unit 12, the substrate (U) is kept at a second predetermined electric potential (V_2 or V_2).

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6. The application device as claimed in one of the preceding claims, characterized in that an electrode arrangement (30) is provided on the upstream side of the applicator unit (12) and in its vicinity, preferably at a distance from the substrate (U), which is kept at a third predetermined electric potential (V_3).

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7. The application device as claimed in claim 6, characterized in that the electrode arrangement comprises at least one flat electrode, the flat electrode preferably having a plurality of projections or needle points on its side pointing toward the substrate.

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8. The application device as claimed in claim 6, characterized in that the electrode arrangement (30) comprises a plurality of individual electrodes, preferably needle electrodes (32), arranged adjacent to one another in the transverse direction of the substrate (U).

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9. The application device as claimed in one of the preceding claims, characterized in that downstream of the position (P) at which the application medium (16) strikes the substrate there is provided a further device (46) for producing an electric field, which

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exerts on the application medium (16) applied to the substrate (U) a force which is directed toward the substrate (U).

5 10. The application device as claimed in claim 9, characterized in that the further field production device has a further electrode arrangement (46) which is adjacent to the substrate (U) and which is preferably kept at a fourth predetermined electric
10 potential (V_4).

11. The application device as claimed in one of claims 4 to 10, characterized in that the first and/or the third and/or the fourth predetermined electric
15 potential (V_1 , V_3 , V_4) have a value of between about 5 kV and about 60 kV, preferably about 30 kV.

12. The application device as claimed in one of claims 5 to 11, characterized in that the second predetermined
20 electric potential (V_2) is the ground potential (V_E).

13. The application device as claimed in claim 12, characterized in that a backing element, preferably a backing roll (22) which, in the case of direct
25 application, supports the material web (20) in the region of the applicator unit (12) or, in the case of indirect application, on the surface of which the applicator unit applies the application medium, is in contact with an electrode in order to keep said roll at
30 the second predetermined electric potential (V_2).

14. The application device as claimed in claim 13, characterized in that the surface (22a) of the backing element (22) is in wiping contact with the electrode
35 (50).

15. The application device as claimed in claim 13 or 14, characterized in that the electrode is in contact

with a bearing shaft (A) of the backing roll (22).

16. The application device as claimed in one of claims 12 to 15, characterized in that, in the case of direct application, the material web (20) is kept at the second predetermined electric potential (V_2) by an electrode (48) formed, for example, as a web guide element.
17. The application device as claimed in one of the preceding claims, characterized in that, in addition to or instead of the electrode arrangement (30) and/or the further electrode arrangement (46), a magnetic field device is provided for influencing the movement of the application medium (16).
18. The application device as claimed in one of the preceding claims, characterized in that, in the direction of movement (L) of the substrate (U), a device (34) for attenuating the air boundary layer (G) carried along by the substrate (U) is arranged upstream of the electrode arrangement (30).
19. The application device as claimed in claim 18, characterized in that the air boundary layer attenuation device comprises a suction device (34).
20. The application device as claimed in claim 19, characterized in that a trailing scraper (36) in wiping contact with the substrate (U) is provided at the downstream end of the suction device (34).
21. The application device as claimed in one of claims 18 to 20, characterized in that a further electrode arrangement (40) is provided in the region of the air boundary layer attenuation device (34), preferably between the downstream end of the suction device (34) and the trailing scraper (36).

22. The application device as claimed in claim 21, characterized in that the further electrode arrangement (40) comprises a plurality of individual electrodes, preferably needle electrodes, arranged adjacent to one another in the transverse direction of the substrate.

23. The application device as claimed in claim 21, characterized in that the further electrode arrangement (40) comprises at least one flat electrode which has a plurality of projections or needle points on its side pointing toward the substrate.

24. The application device as claimed in one of claims 21 to 23, characterized in that the further electrode arrangement (40) has a distance from the substrate of between about 2 mm and about 30 mm.

25. The application device as claimed in one of claims 21 to 24, characterized in that the electric potential of the further electrode arrangement (40) is kept floating.

26. The application device as claimed in one of claims 21 to 25, characterized in that the further electrode arrangement (40) is arranged on the air boundary layer attenuation device (34) electrically insulated (42) from the latter.

27. The application device as claimed in one of the preceding claims, characterized in that the applicator unit (12) and/or the air boundary layer attenuation device (34) is kept at a predetermined electric potential (V_2), preferably ground potential.

28. A device (10) for applying liquid or pasty application medium (16) to one or both sides of a

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moving substrate (U), comprising a curtain applicator unit (12) which discharges the application medium (16) onto the substrate (U) as a curtain (18) or veil moving substantially under the force of gravity, the substrate (U), in the case of direct application, being the surface (20a) of a material web (20), in particular of paper or board, and, in the case of indirect application, being the surface of a transfer element, preferably of a transfer roll, which then transfers the application medium to the surface of the material web, characterized in that edge guiding elements (54) are provided, which guide the lateral edges (18a) of the application medium curtain (18) at least on part of its movement under the force of gravity between the curtain applicator unit (12) and the substrate (U).

29. The application device as claimed in claim 28, characterized in that the surface characteristics of at least one edge guiding element (54) are chosen in such a way that the wetting angle (α), which depends on the characteristics of the application medium (16) and the surface (54a) of the edge guiding elements (54), is less than 90° .

30. The application device as claimed in claim 28 or 29, characterized in that at least one edge guiding element (54) has a structured surface.

31. The application device as claimed in claim 30, characterized in that the surface (54a) of at least one edge guiding element (54) is roughened.

32. The application device as claimed in claim 30, characterized in that at least one edge guiding element (54) has a toothed surface (54a).

33. The application device as claimed in claim 32, characterized in that at least one edge guiding element

(54) has an external thread.

34. The application device as claimed in one of claims 28 to 33, characterized in that at least one
5 edge guiding element (54) is fabricated from glass or metal.

35. The application device as claimed in one of claims 28 to 34, characterized in that at least one
10 edge guiding element (54) is arranged such that it can be displaced in the transverse direction (Q) of the substrate (U).

36. The application device as claimed in one of
15 claims 28 to 35, characterized in that the angle which an edge guiding element (54) forms with the vertical is adjustable.

37. The application device as claimed in one of
20 claims 28 to 36, characterized in that an electrode (56) is provided in the vicinity of at least one of the edge guiding elements (54), preferably extending substantially parallel to the latter, and is kept at a predetermined electric potential (V_s).